

Montana Height Modernization Program Plan

A public-private partnership to improve elevation and positional information for public health & safety, and economic development, and to support commerce...



1964 Flood ~ Flathead County, Montana

	Reliable	Accurate
Cost-effective	Standardized	Legally Established

Montana Height Modernization Plan

A public-private partnership for improving positional information for public health & safety, and economic development, and to support commerce...

The challenges of managing a rapidly growing state and the need to respond to Homeland Security and emergencies make it imperative that Montana continue to develop and improve its geographic information infrastructure. Montana Height Modernization provides a mechanism for significantly improving the accuracy of our geographic information and maps and provides infrastructure for the future. Height Modernization will greatly assist Montana in managing critical issues and will support commerce with safe, efficient, and environmentally sound transportation by providing a better way to integrate data.

This will greatly assist Montana in managing critical issues, such as:

- **Homeland Security**
- **Economic Development**
- **Energy Development & Transmission**
- **Flood Mapping**
- **Wildland Fires**
- **Environmental Protection**

Height Modernization is an effort of the National Geodetic Survey (NGS), an agency within the National Oceanic and Atmospheric Administration (NOAA), to assist states in improving their geodetic control networks. The primary goal of Montana Height Modernization is to utilize Global Positioning System (GPS) technology and establish a statewide geodetic network that efficiently supports and improves all mapping, surveying and engineering activities.

Height Modernization in Montana will mean :

- A denser, more accurate geodetic control network tied to the National Spatial reference system; available statewide (not just in the most populated areas).

- A framework for a more accurate, more accessible GIS, available statewide.
- An accurate control network to aid the mapping of critical infrastructure and supporting accurate up-to-date maps.

Height Modernization will help Montana to:

- Resolve floodplain inaccuracies and provide reliable vertical control for floodplain certification,
- Provide communities with accurate information about flood risks.
- Facilitate spatial information sharing between organizations, minimize data analysis errors, and reduce unnecessary duplication of data.
- Support precision agriculture, by making GPS driven agriculture less expensive, and by increasing the efficient application of fertilizers and pesticides, while reducing pollution.
- Enhance and support reservoir and well monitoring.
- Improve the positioning of well locations.
- Improve the efficiency of existing water delivery systems and sewer systems, which can greatly reduce the cost of developing new systems.
- Enhance and benefit transportation engineering; navigation; tracking; and planning.

Other states that implemented Height Modernization have demonstrated significant cost savings. Montana can also realize economic and cost savings benefits through implementing Height Modernization. While many benefits of Height Modernization will be realized immediately, some of the technical issues behind accurately determining elevations and positions using GPS are much more

complex. Such issues are the main reason for the estimated total **6**-year timeline. In addition to the benefits listed above, the end result of Montana Height Modernization will be a tremendously improved system for determining positions throughout the state, in terms of accuracy, accessibility, and vastly reduced user cost.

Requested Action

We request that the Montana Congressional delegation support Montana Height Modernization by adding \$950,000 for Montana in the Geodesy line of the “National Ocean Service” portion of NOAA’s (National Oceanic and Atmospheric Administration) Department of Commerce Budget. Continuing support of the Montana Height Modernization Program in the out-years will be required to provide the benefits outlined in this briefing packet. Current estimates indicate **\$5.0M** is required over a **6**-year period to fully implement Height Modernization across all of Montana. The requested initial funding for Montana of \$950,000 will support the following:

1. Establish Geodetic Reference Center (GRC) at the Montana Department of Transportation
2. Begin a Mark Recovery Program (recover previous investment in monuments)
3. Reconnaissance of sites for future CORS installations and begin installations.
4. Perform Demonstration High Growth Area Height Modernization Project(s)

<i>Item</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Year 6</i>	<i>Total</i>
GRC	\$240,000	\$240,000	\$190,000	\$190,000	\$190,000	\$190,000	\$1,240,000
Projects	\$370,000	\$370,000	\$370,000	\$320,000	\$270,000	\$270,000	\$1,970,000
Geodetic Network	\$340,000	\$340,000	\$340,000	\$290,000	\$240,000	\$240,000	\$1,790,000
Total Cost	\$950,000	\$950,000	\$900,000	\$800,000	\$700,000	\$700,000	\$5,000,000
Funding Sources							
MDOT							
NOAA							

Background

Height Modernization is an effort of the National Geodetic Survey (NGS), an agency within the National Oceanic and Atmospheric Administration (NOAA), to assist states in improving their geodetic control networks. A geodetic control network is the fundamental reference system used for all mapping activities, whether they are national or local in scope. Height Modernization began as a technical effort to use emerging Global Positioning System (GPS) technology to determine and propagate precise elevation information in Montana,.

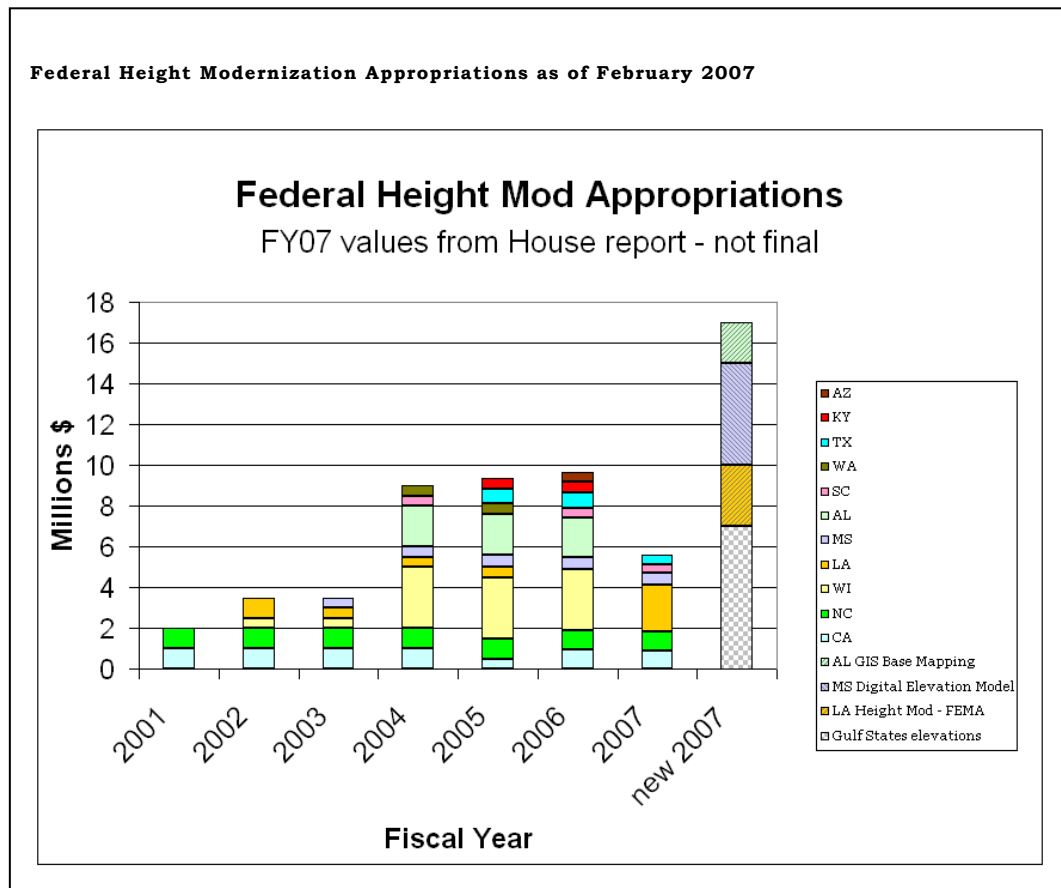
The primary goal of Montana Height Modernization is to augment state geodetic resources to efficiently support all surveying, engineering and mapping activities. The effort in Montana to obtain Height Modernization funding is being led by a consortium of public and private sector surveyors, GIS professionals, and agency program managers. This group is comprised of geospatial information professionals, surveyors, and engineers from, Montana Department of Transportation, Montana Department of Administration, Montana Department of Environmental Quality, NGS, and other GIS professionals and land surveyors, including the Montana Association of Registered Land Surveyors. The private sector will contribute by assisting in such efforts as the Mark Recovery Program, building the CORS, installing benchmarks, leveling, and GPS observation campaigns.

To date, eleven states have received Height Modernization funds ranging from approximately \$500,000 to \$3,000,000. FY06 appropriations total \$9.9M (see Table 1) for nine states. No matching funds have been required and the only

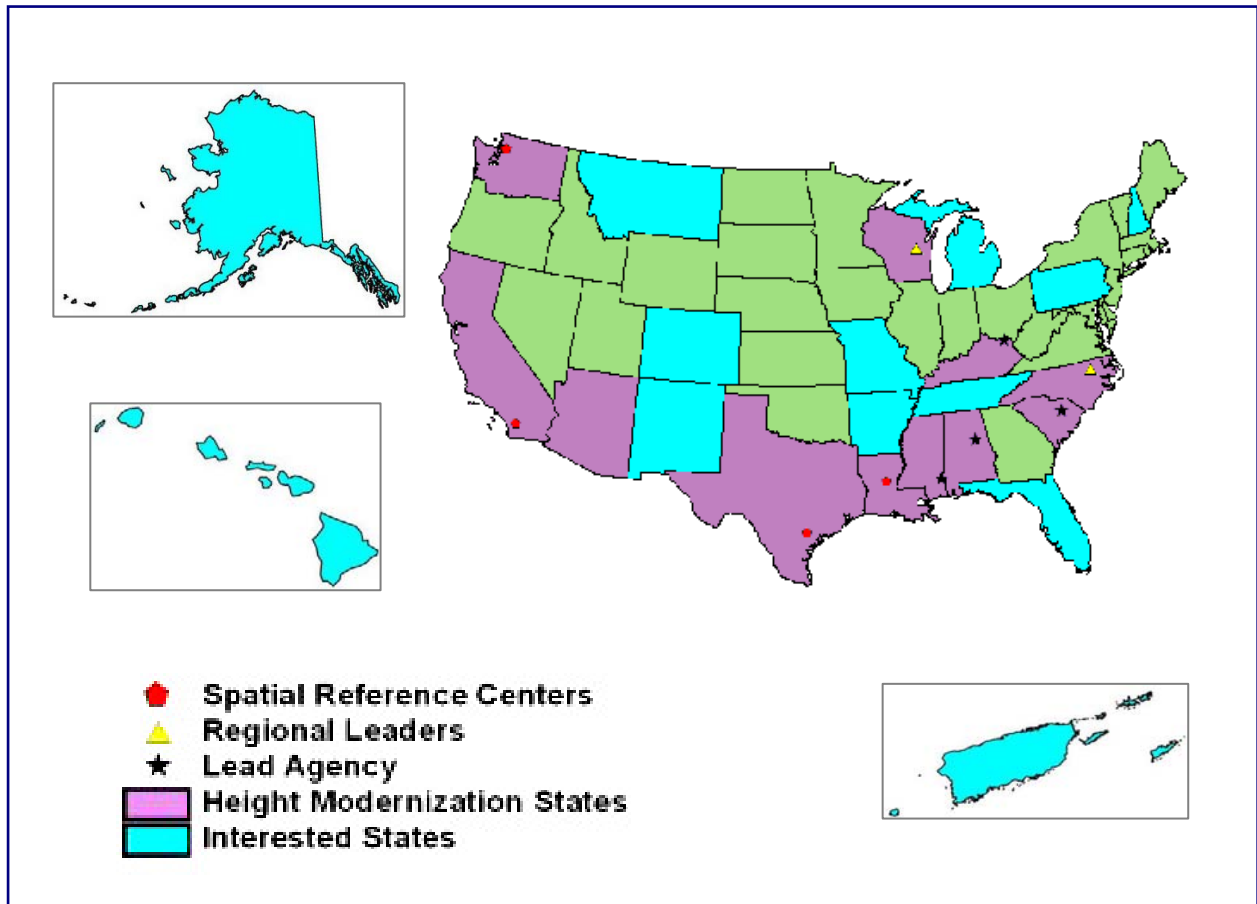
requirement placed on partners is for geodetic data resulting from projects funded under Height Modernization be placed in the public domain.

Table 1 - Height Modernization Program Funding

FISCAL YEAR	APPROPRIATIONS	STATES
2001	2.25 M	CA, NC
2002	3.75 M	CA, NC, LA, WI
2003	3.75 M	CA, NC, LA, WI, MS
2004	9.0 M	CA, NC, LA, WI, MS, AL, WA, SC
2005	9.6 M	CA, NC, LA, WI, MS, AL, WA, TX, KY
2006	9.9 M	CA, NC, WI, MS, AL, SC, TX, KY, AZ



Height Modernization Program Status Map – February 2007



Montana Height Modernization: The Need Today and the Promise Tomorrow

Rapid growth, wild land fires, Homeland and border security, drought, and flood management — these are among the challenges facing Montana now. Through Height Modernization, existing technologies can be better integrated and used more cost effectively to enable Montana to improve its ability to intelligently manage the issues it faces today. Importantly, it will also enable Montana to build a spatial infrastructure that is wisely positioned to take full advantage of inevitable future advances in technology. Height Modernization will help with today's challenges while laying a foundation for tomorrow's opportunities, and support commerce with information for safe, efficient, and environmentally sound transportation.

Project Management

The Montana Department of Transportation would receive and administer Height Modernization funds through a grant from NGS. The Montana Department of Transportation will establish and administer Height Modernization funds through, the Montana Geodetic Reference Center (MGRC) using the guidelines developed by the Height Modernization Working Group in conformance with state procurement regulations. The NGS Advisor to Montana, housed in the office of the MGRC, will ensure conformance to NGS technical specifications.

Year One - \$950,000

Y1.a: Geodetic Reference Center at the Montana Department of Transportation

Description: Establish a Montana Geodetic Reference Center with responsibility for

- Managing Height Modernization Projects & Contracts;
- Coordinating and lead MSDI Geodetic Control efforts;
- Managing, in cooperation with MT ITSD GIS Bureau, the Montana Coordinate data (control point database) - help to make Ht Mod data available to the public;
- Education and outreach for geodetic reference systems, elevation and positional information;
- Providing leadership and guidance on elevation and positioning related projects, such as elevation data (Montana Spatial Data Infrastructure [MSDI] hypsography);
- Mark Recovery Program - Contract work for state-wide mark recovery program to update the NGS recovery notes for all vertical (and horizontal) marks in the state. This is not a rehabilitation or monumentation program. This is merely to identify which marks still exist and are suitable for projects. The bulk of this work must be done the first year in order to assist the planning for future projects and to identify problem areas for vertical control;
- Support densification of the Montana Continuously Operating Reference System (CORS).

Cost: \$240,000

Timeline: Begin when grant funding becomes available and to continue on an ongoing basis.

Y1.b Demonstration Height Modernization Project

Description: Install new marks and re-observe existing stable vertical control marks sufficient to meet the demand in a high growth area.

Cost: \$370,000

Timeline: Begin year one and complete within 18 months

Y1.c CORS Projects

Description: Install ten CORS stations around the state in the High Priority areas.

Cost: \$340,000 (software + equipment, materials and installation of 10 CORS).

Timeline: Begin year one and complete within 12 months

Year Two:

Y2.a: Geodetic Reference Center

Description: Continue to fund the Montana Geodetic Reference Center as previously described; create a prioritized list of areas that need new vertical control; develop a plan to install that control; and let contracts for the necessary work.

Cost: \$ 240,000

Timeline on-going

Y2.b High Growth Areas Height Modernization Projects

Description: Install new marks and re-observe existing stable vertical control marks and perform GPS observations on new and existing vertical control sufficient to meet the demand in the priority high growth areas.

Cost: \$370,000 per year

Timeline: Begin year one and complete within 18 months

Y2.c CORS Projects

Description: Install new CORS stations around the state in the High Priority areas.

Cost: \$340,000 per year

Timeline: Ten or more per year

Year Three, Four, Five & Six:

Y3, Y4, Y5 & Y6.a: Geodetic Reference Center

Description: Continue to fund the Montana Geodetic Reference Center as previously described; create a prioritized list of areas that need new vertical control; develop a plan to install that control; and let contracts for the necessary work.

Cost: Y3-\$190,000, Y4-\$190,000, Y5-\$190,000, Y6-\$190,000

Timeline on-going

Y3, Y4, Y5 & Y6.b High Growth Areas Height Modernization Projects

Description: Continue to identify high priority growth areas. Install new marks and re-observe existing stable vertical control marks and perform GPS observations on new and existing vertical control sufficient to meet the demand in identified priority high growth areas

Cost: Y3-\$370,000, Y4-\$320,000, Y5-\$270,000, Y6-\$270,000

Timeline on-going

Y3, Y4, Y5 & Y6.c CORS Projects

Description: Maintain CORS network and continue to install new CORS stations around the state in the High Priority areas.

Cost: Y3-\$340,000, Y4-\$290,000, Y5-\$240,000, Y6-\$240,000

Timeline: Y3-maintain existing and install ten or more, Y4- maintain existing and install seven or more, Y5- maintain existing and install five or more, Y6- maintain existing and install five or more

Cost Summary for Six Year Plan:

<i>Item</i>	<i>Year 1</i>	<i>Year 2</i>	<i>Year 3</i>	<i>Year 4</i>	<i>Year 5</i>	<i>Year 6</i>	<i>Total</i>
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